book review corner

(continued from page 90)

Critical flows are passed over lightly before empirical methods for calculating pressure drop are discussed, including those of Martinelli and Baroczy. The separate cylinders model is briefly introduced. Slip and the calculation of void fraction from phase flow rates are also touched on before discussion on the three major flow patterns—bubbly, slug, and annular.

The second and third major areas (boiling and burnout) comprise the most extensive segment of this book. Beginning with the fundamentals of pool boiling, the authors discuss the boiling curve, cavities, and bubble growth. Problems of forced convection in the general case are then dealt with including nucleation, heat transfer characteristics, void fraction, and pressure drop. This is followed by a fairly extensive discussion of annular film evaporation, which is the alter ego of liquid film flow condensation (also covered later). Both laminar and turbulent models are included. Correlations for estimating heat transfer rates in vertical flow boiling are next summarized followed by discussions on the difficulties of estimating heat transfer in horizontal flows. A fairly extensive introduction to pool boiling critical heat flux (CHF), is followed by a section on convective CHF. Both the departure from nucleate boiling and dryout models are discussed, and methods of predicting burnout are provided.

The next two sections on fouling and instability are covered in the most cursory manner. Not much is said regarding the former, because, I'm sure, of the current state of our knowledge. The two chapters on instability were the most disappointing in the book in view of the large amount of good work done to date in this area. Qualitative explanations are provided for the following types of instabilities: Ledinnegg; inlet compressibility; chugging; acoustic; and parallel channel. Typical experimental observations such as the effects of inlet subcooling and inlet resistance are presented for particular systems. A rather lengthy qualitative description of frequency domain concepts concludes the section on flow instabilities.

The various models of condensation—filmwise, homogeneous, dropwise, direct contact, and immiscible liquid—are next outlined. Included in brief are nucleation theory and the effects of noncondensibles. A rather detailed summary is given of laminar film condensation on vertical surfaces beginning with Nusselt's theory. Individual differences resulting from subcooling, inertia, superheat, waviness, and turbulence are separately discussed and related to the classical solution of Nusselt. External condensation and internal condensation for horizontal tubes are also discussed. Methods of calculating heat transfer coefficients are given in all cases.

In summary, this book presents a brief and in some respects qualitative overview of its title subject. Were I teaching a graduate course, I would find that the book's superficiality would quickly limit its utility. On the other hand, although its lack of example problems and exercises might prove burdensome, this book does seem useful as a textbook for an advanced undergraduate or graduate level survey course for persons other than those majoring in heat and mass transfer. It is the first I have found that "covers the waterfront."

Index for Volume 1, 1979–1980

Authors

Baker, C. K., 28 (2)
Berg, J. L., 21 (4)
Berg, W. F., 21 (4)
Breber, G., 47 (2)
Carnavos, T. C., 41 (2); 32 (4)
Cocks, A. M., 31 (1)
Collier, J. G., 56 (3)
Cooper, A., 31 (1); 50 (3)
Davies, L. M., 56 (3)
Gaddis, E. S., 43 (1)
Henderson, J. B., 53 (4)
Henton, A. C., 31 (1)
Ishihara, K., 23 (3)
Levy, S., 47 (4)
Ortt, J. R., 38 (4)
Osborne, M. W., 38 (4)
Palen, J. W., 47 (2); 23 (3)
Parker, J. D., 53 (4)
Ramdas, V., 38 (4)
Schlünder, E. U., 43 (1)
Suitor, J. W., 50 (3)
Small, W. M., 21 (2)
Taborek, J., 15 (1); 47 (2); 23 (3)
Uhl, V. W., 38 (4)
Usher, J. D., 50 (3)
Walter, G. H., 28 (2)
Webb, R. L., 33 (3)
Wiebelt, J. A., 53 (4)
Young, R. K., 21 (2)

Titles

Air-side heat transfer in finned tube heat exchangers, 33 (3)
Application of dynamic modeling technique to the analysis and prediction of heat transfer with particular reference to agitated vessels, 28 (2)
Cooling air in turbulent flow with internally finned tubes, 41 (2)
Cooling water fouling in plate heat exchangers, 50 (3)
Critical review of correlations for predicting two-phase flow pressure drop across tube banks, 23 (3)
Evolution of heat exchanger design techniques, 15 (1)
Flow patterns for isothermal condensation in one-pass air-cooled heat exchangers, 21 (4)
Free convection heat transfer from the outside of radial fin tubes, 53 (4)
Heat transfer in a scraped-wall, continuous unit, 38 (4)
Heat transfer performance of internally finned tubes in turbulent flow, 32 (4)
Improved water utilization with plate heat exchangers, 31 (1)
Prediction of flow regimes in horizontal tube-side condensation, 47 (2)
Temperature distribution and heat exchange in multipass shell-and-tube exchangers with baffles, 43 (1)
The accident at Three Mile Island, 56 (3)
The RODbaffle heat exchanger, 21 (2)
Three Mile Island: A call for fundamentals and real-time analysis, 47 (4)

Numbers in parentheses are issue numbers.